

## ABSTRACT

*This study aims to synthesize and analyze tantalum oxide ( $Ta_2O_5$ ) nanoparticles as contrast agents for CT-scan imaging. The synthesis was conducted using the pulsed laser ablation method with varying synthesis times of 15, 30, 60, and 120 minutes. The results showed that increasing the synthesis time resulted in an increase in nanoparticle concentration, as indicated by changes in colloidal color and UV-Vis absorbance spectra. Spherical morphology with an average size of 8.2 nm was observed through TEM characterization. XRD analysis showed that the nanoparticles were in the orthorhombic  $Ta_2O_5$  phase, and FTIR identified the presence of Ta–O, TaO–H, and O–H bonds. UV-Vis analysis showed a nonlinear increase in light absorbance as the synthesis time increased. Tantalum nanoparticles exhibited higher CT-numbers and contrast-to-noise ratio (CNR) values with increased synthesis times. At X-ray tube voltages of 80, 100, and 120 kV, the LOD for tantalum oxide nanoparticles as a contrast agent corresponded to synthesis times of 66.73, 47.55, and 15.36 minutes, respectively. These results indicate that tantalum oxide nanoparticles have great potential as CT-scan contrast agents.*

**Keywords :** *Tantalum oxide, pulsed laser ablation, contrast agent, CT-scan*